Willkommen beim #GAB2016!

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Stream Processing mit Azure

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Microsoft UBIDO AN ACP GROUP COMPANY HOTCHEET time cockpit windows .developer

Inhalte

- Motivation / Einführung
- Microsoft‘s **Azure Stream Analytics + Demo**
- Fragen & Zusammenfassung

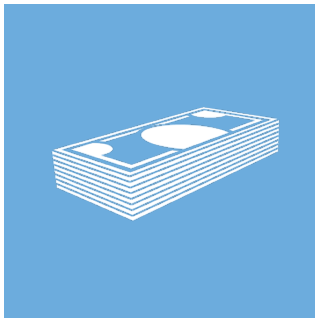
Warum Datenstromanalyse in der Cloud?

Eventbasierte Daten befinden sich oftmals bereits in der Cloud

Ein Großteil der Daten ist nicht mehr lokal

"Bring the processing to the data, not the data to the processing!"

Eventbasierte Daten sind immer häufiger global verteilt

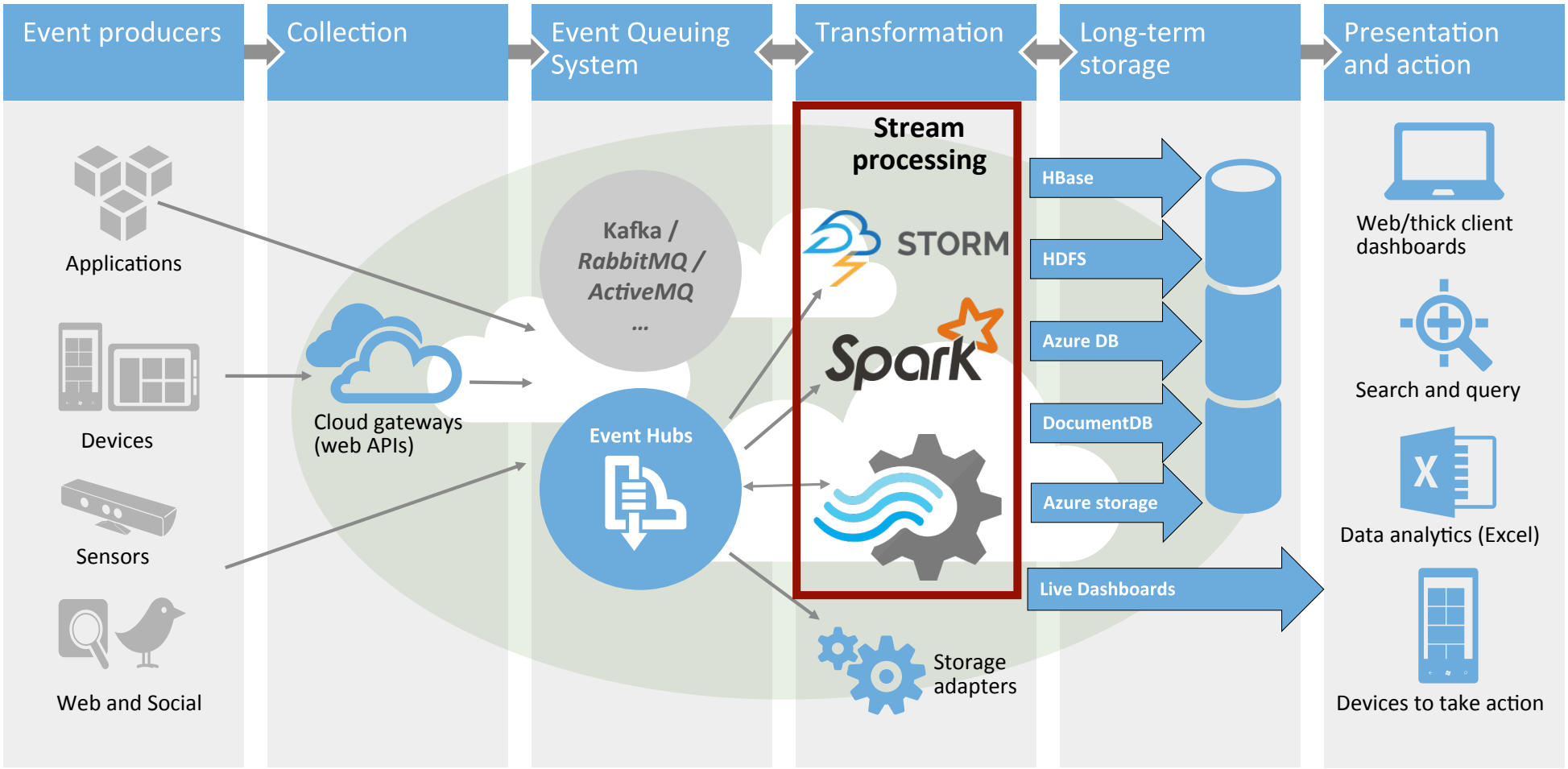


Reduced TCO

Elastic scale-out

Service, not infrastructure

Datenstromanalyse in der Cloud



Azure Stream Analytics

"…is a fully managed, cost effective real-time event processing engine that helps to unlock deep insights from data."

Rasche / Einfache Entwicklung

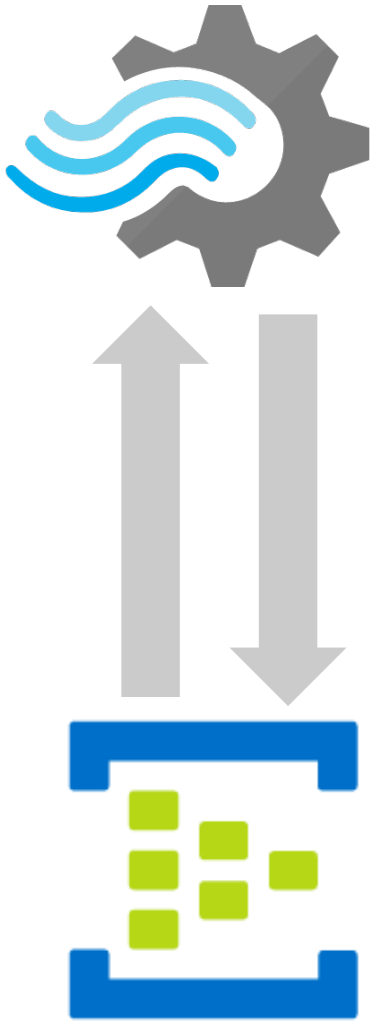
Zuverlässigkeit & Skalierbarkeit

Echtzeitnahe Verarbeitung

Azure Stream Analytics

Charakteristiken

- sehr kurze Einarbeitungszeit durch T-SQL Syntax
- nahtlose Integration zu Azure Event Hubs
- Kombination von Streams und statischen Daten
- horizontale Skalierung
- niedrige Latenz unter hoher Last
- garantierte Verfügbarkeit (99.9%)
- defacto kein administrativer Aufwand



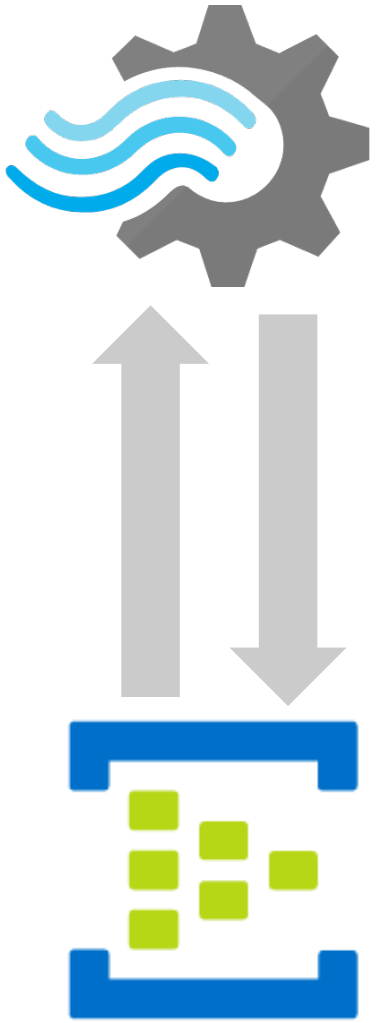
Azure Stream Analytics

Skalierungskonzept

- durch mehrere sog. Streaming Units (SU)
  → kombiniertes Maß an CPU, RAM und I/O

- per default 1 SU/Job
- 1 SU bietet Durchsatz bis ~1MB/Sek.
- im Standard Account gesamt max. 50 SUs

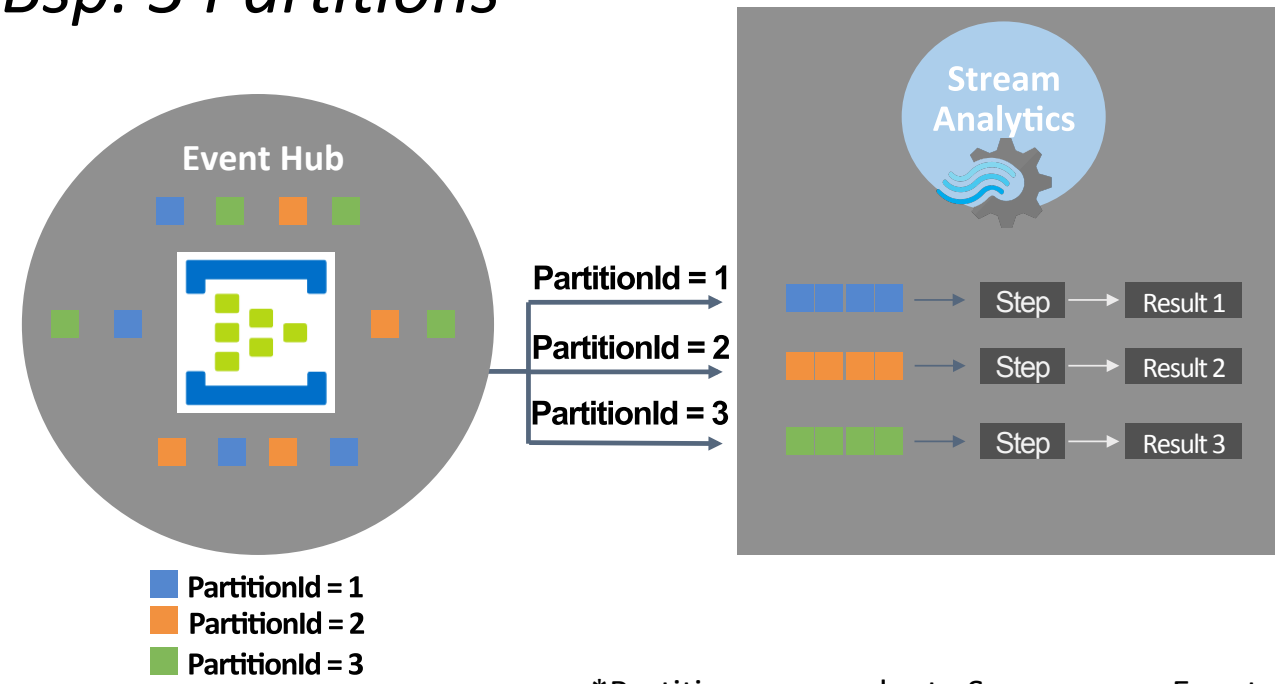
→ Einsatz mehrerer SUs abhängig von entwickelter Abfrage sowie Partitionskonfiguration der involvierten Datenquellen



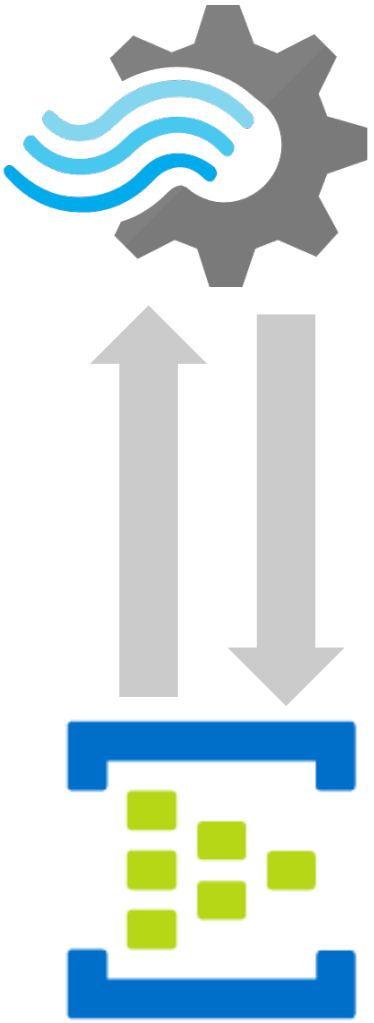
Azure Stream Analytics

Skalierungskonzept

*Bsp. 3 Partitions**

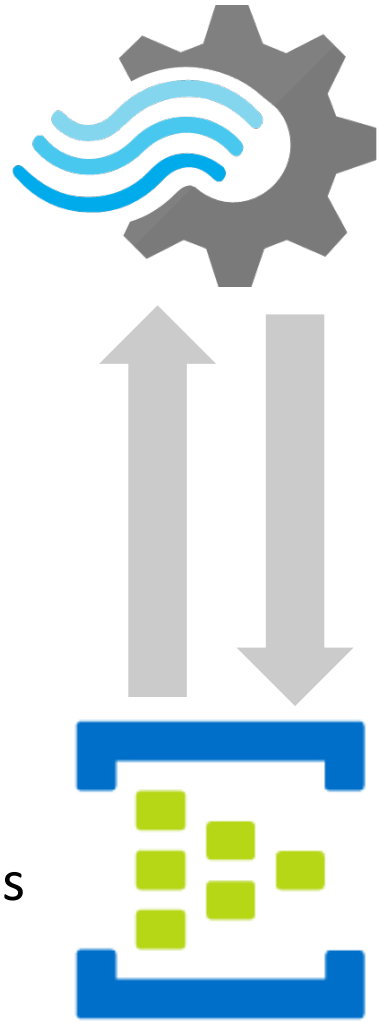


*Partition == geordnete Sequenz von Events



Azure Stream Analytics

Skalierungskonzept



→ hochgradig paralleler Job sofern:

- #Input Partitionen == #Output Partitionen
- partitionierte Abfrage: **Partition By PartitionId**
- falls mehrstufige Abfrage alle mit gleicher Partitionierung

pro Partitionsabfrage sind bis zu 6 SUs verwendbar

alle nicht partitionierten Abfrageschritte gemeinsam max. 6 SUs

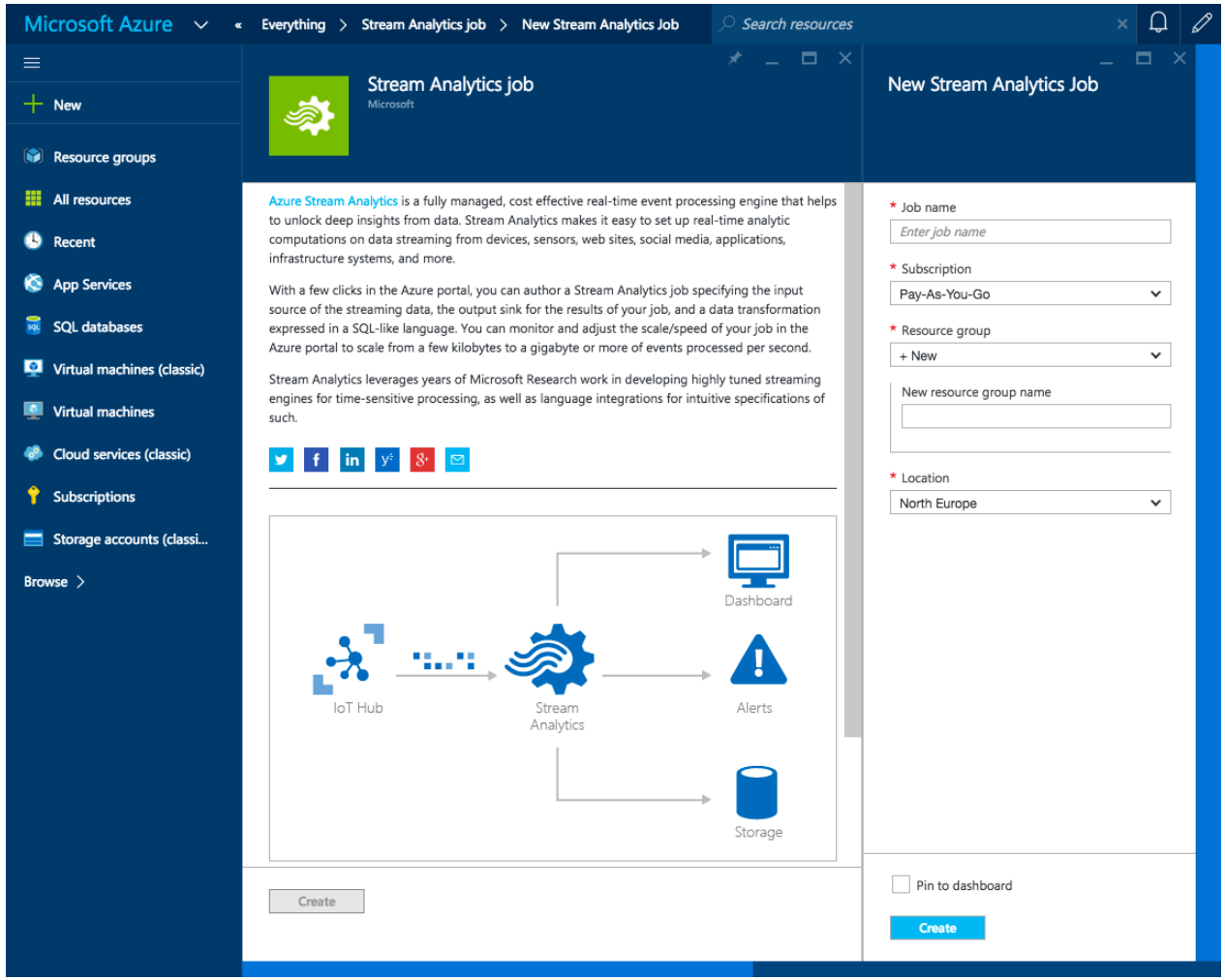
https://azure.microsoft.com/en-us/documentation/articles/stream-analytics-scale-jobs/

Azure Stream Analytics

5 Schritte:

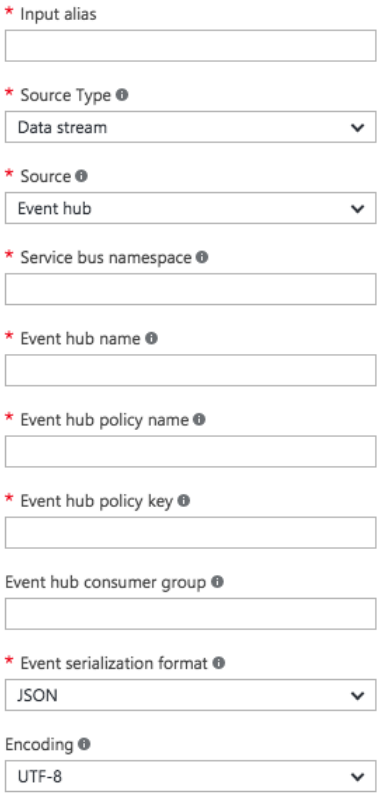
1) Stream Analytics Job erzeugen
2) Inputquelle(n) definieren
3) Abfrage mit T-SQL Syntax entwickeln
4) Outputquelle(n) definieren
5) Job starten & überwachen

Azure Stream Analytics



Azure Stream Analytics

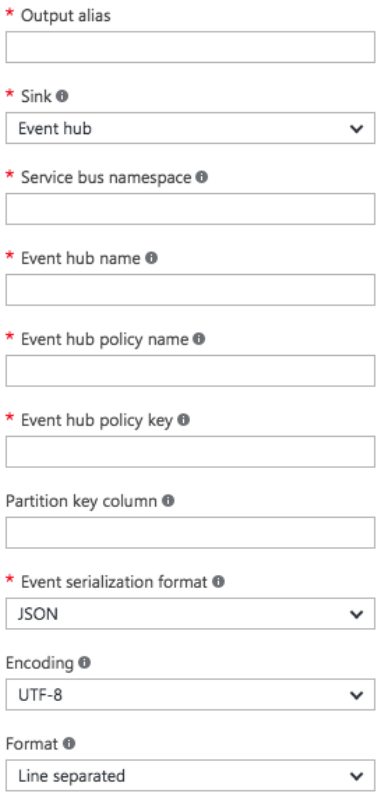
Inputquellen:



- **Data Streams**
  => EventHub, IoT Hub, BlobStorage
- **Reference Data**
  => BlobStorage
- **Formate:** JSON, CSV, Avro
- **Encoding:** UTF-8

Azure Stream Analytics

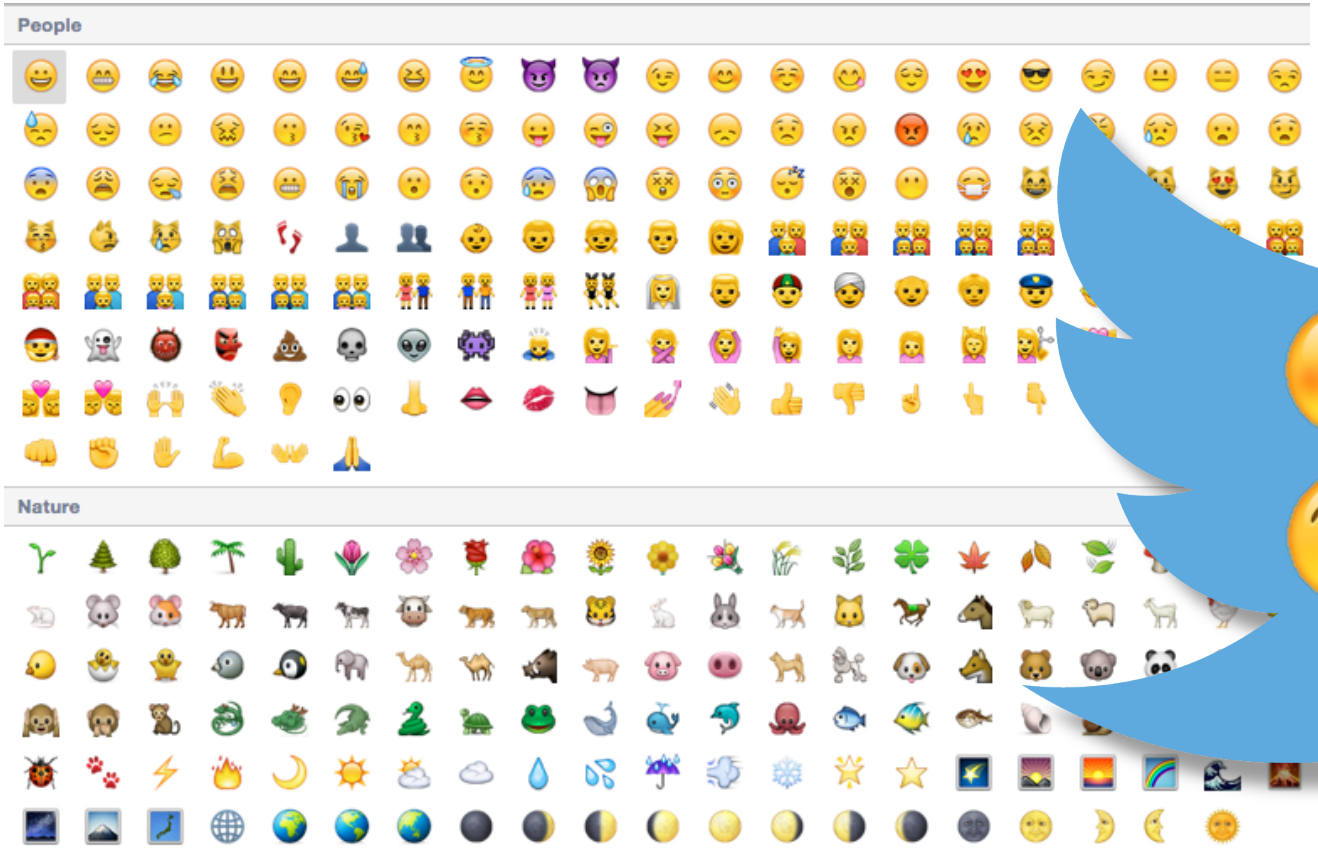
Outputquellen:

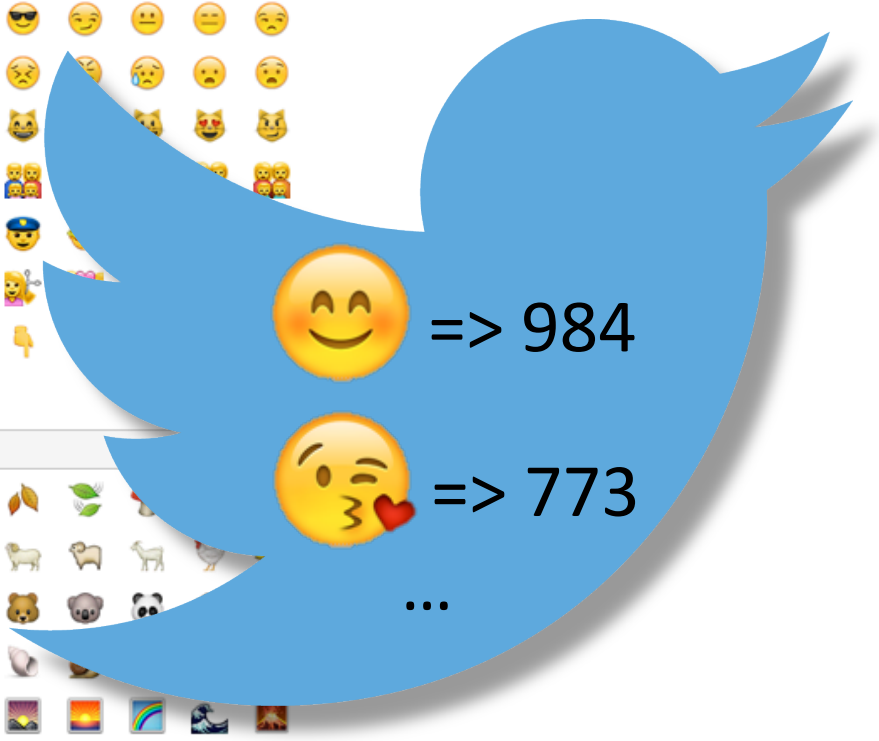


- **Azure SQL DB, BlobStorage, EventHub,**
- **Table Storage, Service Bus (Queues & Topics),**
- **DocumentDB, Power BI**

Demo-Anwendung

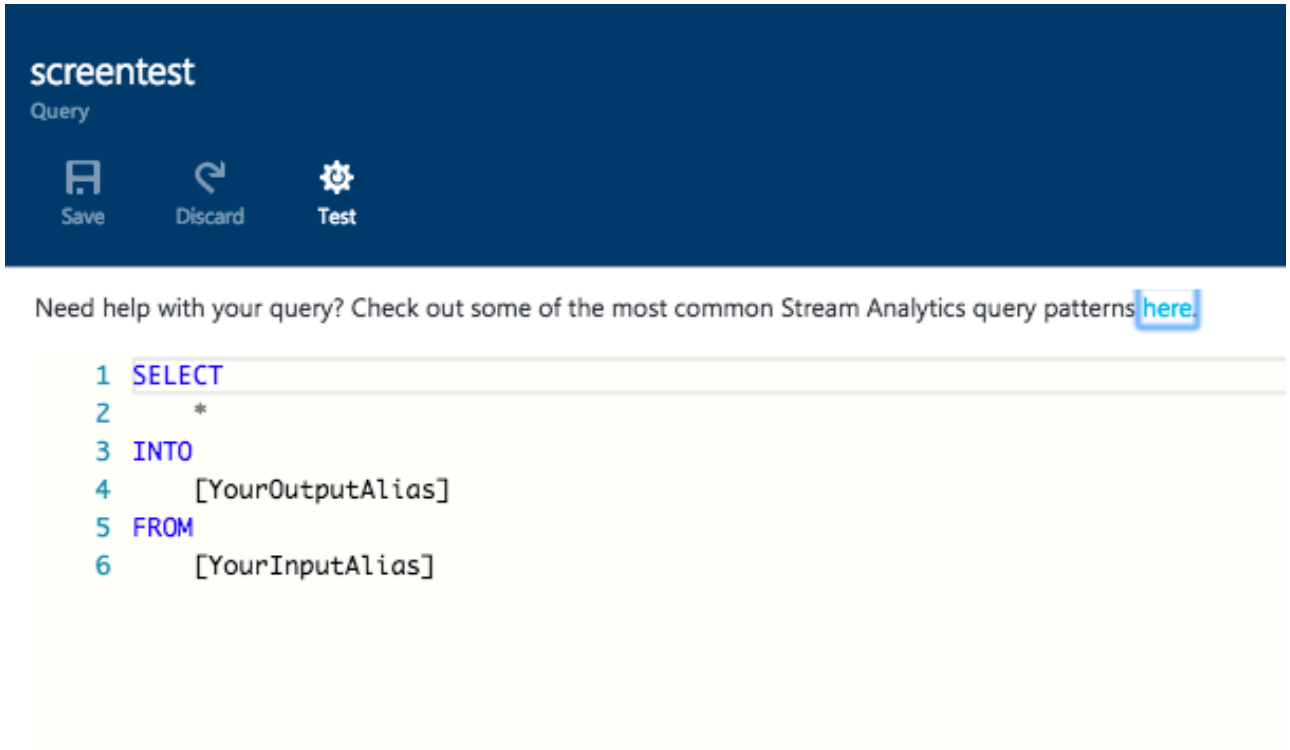
=> Tracking Emojis in public Tweets





Azure Stream Analytics

Abfrage Editor



Azure Stream Analytics

Abfrage Sprache

- Subset von standard T-SQL Syntax

DML Statements

- SELECT
- FROM
- WHERE
- GROUP BY
- HAVING
- CASE
- JOIN
- UNION

Date and Time Functions

- DATENAME
- DATEPART
- DAY
- MONTH
- YEAR
- DATETIMEFROMPARTS
- DATEDIFF
- DATADD

String Functions

- LEN
- CONCAT
- CHARINDEX
- SUBSTRING
- PATINDEX

Scaling Functions

- WITH
- PARTITION BY

Aggregate Functions

- SUM
- COUNT
- AVG
- MIN
- MAX

Array Functions

…

Analytic Functions

…

https://msdn.microsoft.com/en-us/library/azure/dn835030.aspx

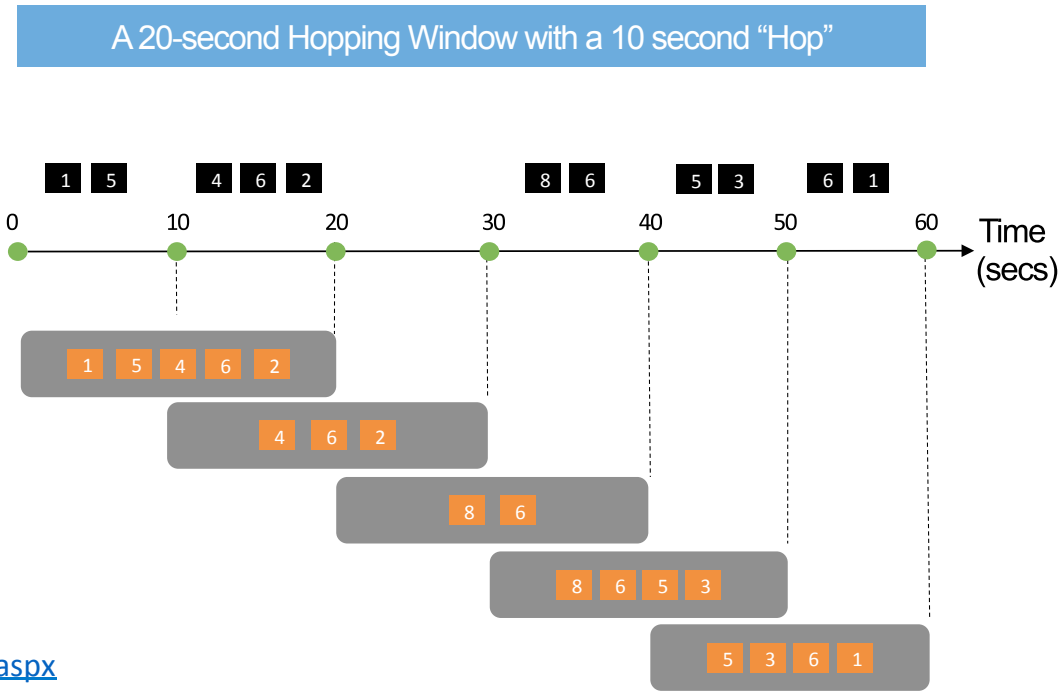
Azure Stream Analytics

Abfrage Sprache

- Windowing Erweiterungen

Hopping Windows (HW)

- wiederholend
- Überlappung möglich
- Versatz um fixe Zeitspanne



https://msdn.microsoft.com/en-us/library/azure/dn835041.aspx

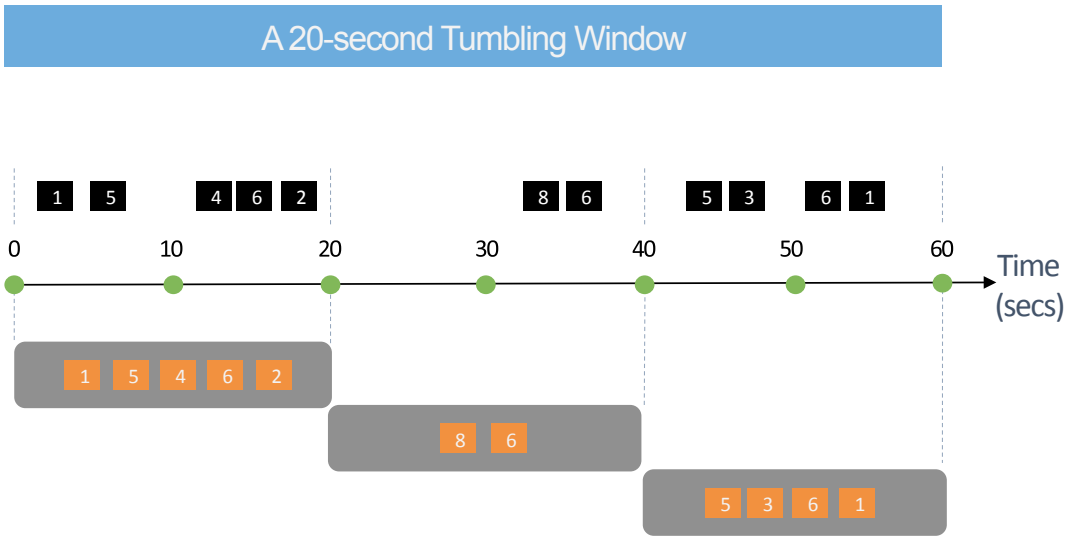
Azure Stream Analytics

Abfrage Sprache

- Windowing Erweiterungen

Tumbling Windows (TW)

- wiederholend
- nicht überlappend



https://msdn.microsoft.com/en-us/library/azure/dn835055.aspx

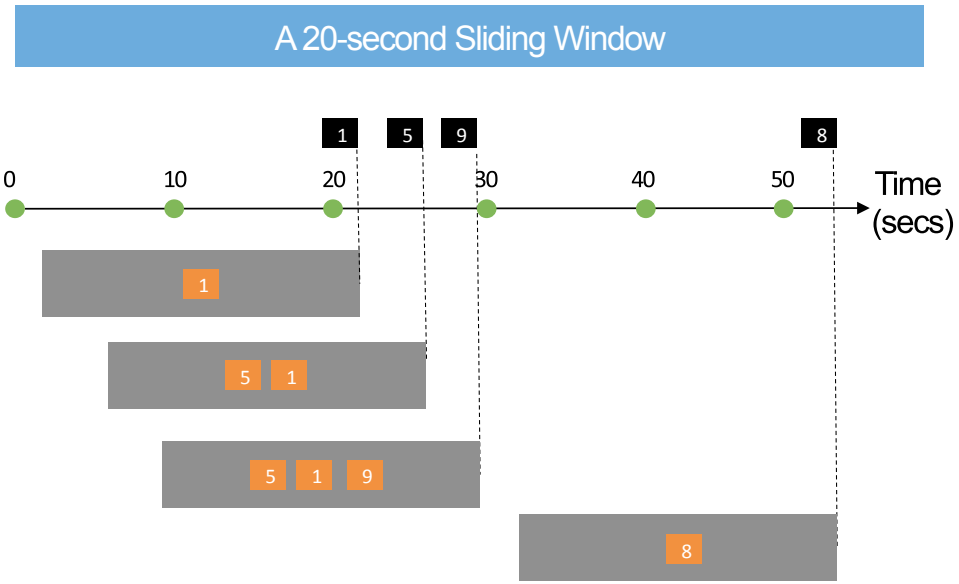
Azure Stream Analytics

Abfrage Sprache

- Windowing Erweiterungen

Sliding Windows (SW)

- „kontinuierliche“ Verschiebung
- Outputs nur bei Änderungen der Daten im Window
  → „Delta-Triggering“
- mind. 1 Event / SW



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Azure Stream Analytics

Zeitversatz Regeln?

→ **„Late arrival“ (Events treffen verspätet ein)**

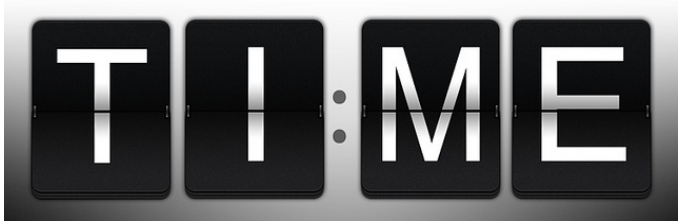
a) Zeitstempel werden ggf. automatisch korrigiert

b) od. Events verworfen

→ **„Out of order“ (Events treffen nicht chronologisch ein)**

a) Events werden ggf. neu-/umsortiert

b) od. Events verworfen



https://www.flickr.com/photos/smemon/5281453002/

Azure Stream Analytics

Abfrage Sprache

- GROUP BYs bzw. JOINs für Datenströme brauchen zwingend Angabe von Zeitpunkt bzw. Zeitspanne

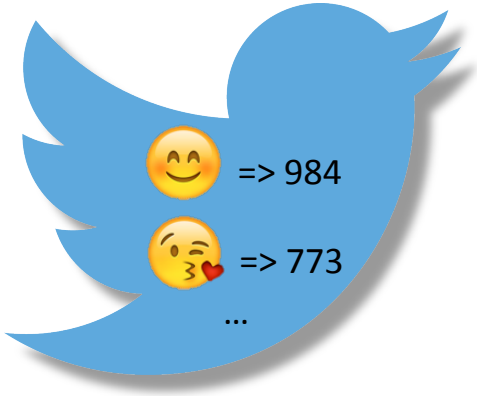
```
GROUP BY [fieldname], [Hopping|Tumbling|Sliding]Window(...)

JOIN ... ON ... AND DATEDIFF(...) BETWEEN 0 AND N
```

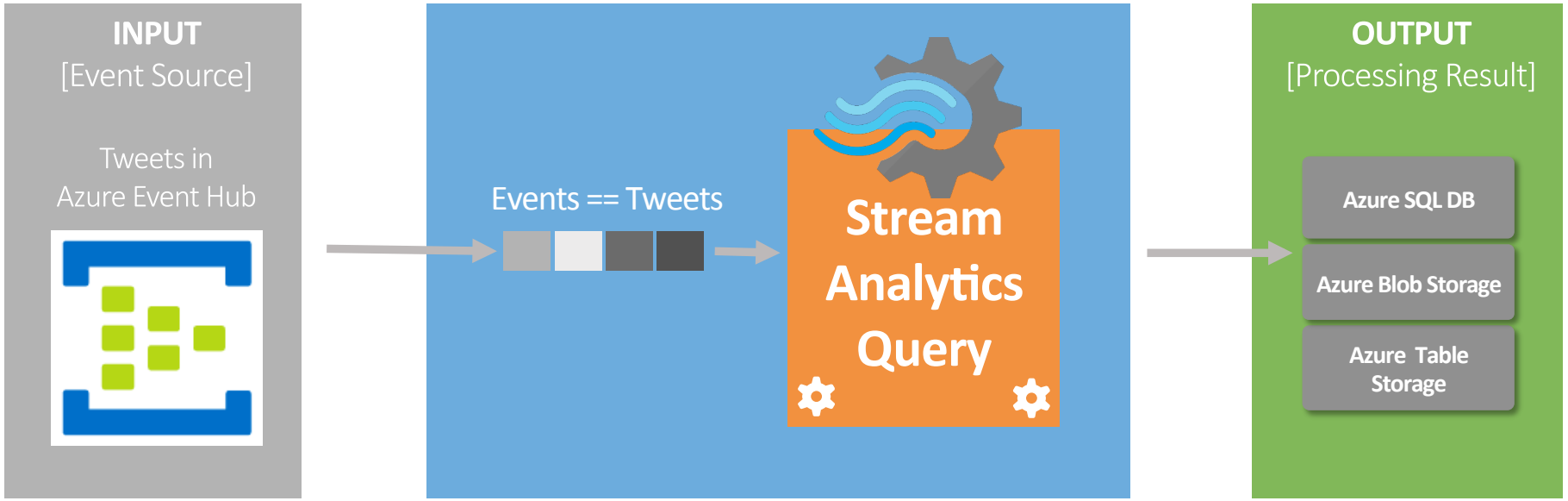
- WITH für „mehrstufige“ Abfragen bzw. zur Erzeugung von temp. Result Sets

```
WITH temp1 AS (SELECT ... FROM input),
      WITH temp2 AS ( SELECT ... FROM temp1) [,...]
            SELECT ... FROM temp2
```

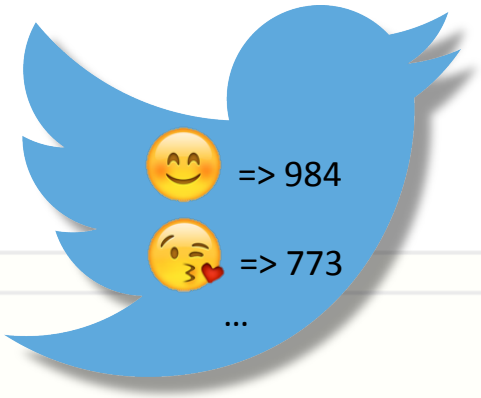
Azure Stream Analytics Demo

=> Tracking Emojis in public Tweets





Azure Stream Analytics Demo




```
1  WITH emojis AS (
2      SELECT
3          emoji.ArrayValue as emj
4      FROM
5          PublicTweetStream as tweets
6      CROSS APPLY GetArrayElements(tweets.emojis) AS emoji
7  )
8  -- store windowed calculations to Azure SQL DB every X secs
9  SELECT emj AS ecode,COUNT(*) AS counter INTO winCountDB FROM emojis
10     GROUP BY emj,TumblingWindow(second,5)
11
12 -- store a projection of raw data to Azure Blob Storage continuously as well
13 SELECT tweets.id,tweets.text AS msg INTO rawEventsBS FROM PublicTweetStream as tweets
14
15 -- store windowed calculations to Azure Table Storage every X secs
16 SELECT CONCAT('emojis_',DATENAME(yyyy,System.Timestamp),'_',DATENAME(mm,System.Timestamp),
17 '_',DATENAME(dd,System.Timestamp),'_',DATENAME(hh,System.Timestamp),'_',DATENAME(mi,System.Timestamp),
18 '_',DATENAME(ss,System.Timestamp)) AS emojiwindow, emj AS ecode,COUNT(*) AS counter INTO winCountTS FROM emojis
19     GROUP BY emj,TumblingWindow(second,30)
```

Azure Stream Analytics

Kurzresumée

++ sehr zugänglich für Einsteiger

++ ausdrucksstarke T-SQL Query-Language

++ flexibles Windowing Konzept für div. Analyseaufgaben

+ viele Azure I/O Quellen out-of-the-box (Event Hub/BlobStorage,SqlDB,...)

+ nahtlose Anbindung an weitere Services z.B. Azure ML

~ Skalierbarkeit: Überlegungen / Konfiguration von Beginn an nötig

- leider (noch?) keine User Defined Functions (abgesehen von Azure ML)

Kontakt

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